Insects on Baby Lima Beans

control experiment using two applications of 5% DDT dust reduced insect injury and increased total yield

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One half of one per cent of the baby lima beans from a field dusted with DDT showed insect damage—compared to 12% in the check plot—following a control experiment during the 1951 season.

A number of species of insects in California feed on lima beans which tends to reduce the total yield and to affect the quality by blemishing the seed. When intended for canning or freezer pack, unblemished beans are essential.

In the San Joaquin Valley several species of bugs, notably *Lygus hesperus* Knight and *Lygus elisus* Van Duzee feed upon the bloom and developing beans. Losses from their feeding result from: *1*, shedding of bloom and young pods; *2*, failure of young pods to size up—buckskins—and *3*, necrotic lesions on the seed.

The presence of too many beans with necrotic spots will cause a loss of grade which frequently necessitates expensive hand removal costs. These costs can soon become prohibitive.

In addition to lygus bugs, there are a number of caterpillars which feed upon the pods and cause additional losses. The most important are the corn earworm, *Heliothis armigera* (Hbn.); the lima bean pod-borer, *Etiella zinckenella* Treit.; the bean lycaenid, *Strymon melinus* (Hbn.); salt marsh caterpillar, *Estigmene acrea* Drury; and the western yellow-striped armyworm, *Prodenia praefica* Grote.

A 30-acre field of Clark's bush baby lima beans near Patterson, Stanislaus County, intended for freezer pack, was found to have a high population of two species of lygus bugs when examined with an insect sweep net early in September 1951. In addition, larvae of the corn earworm, lima bean pod borer and western yellow-striped armyworm were present in small numbers.

An experiment was initiated to determine how much benefit would result from the application of DDT to control the insects.

On September 5, there was an average of 2.9 lygus bugs per sweep in the field. This is considered to be a heavy population.

The first treatment with a 5% DDT dust was applied by airplane on September 7, 1951, at the rate of approximately 30 pounds per acre. A second application was made on September 20 at 35 pounds per acre. Approximately 0.5 acre was left untreated as a check.

Lygus counts were made at weekly intervals in both the treated and untreated areas. Counts were made by sweeping across two rows with an insect net, with five sweeps to a station.

The beans were cut for freezing on October 3, 1951, at which time the harvest samples were taken, consisting of 50 plants selected at random from the treated area and a like number from the check. All pods were removed from these plants and examined for lygus and worm damage. These were segregated, classified and counted.

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Average Number of *Lygus* spp. per Sweep in a Field of Clark's Bush Baby Limas at Patterson, California, 1951

Treatment	September 5			September 13			September 19			September 26		
	Adults	Nymphs	Total	Adults	Nymphs	Total	Adults	Nymphs	Total	Adults	Nymphs	Total
Check	1.8	1.1	2.9	0.9	3.6	4.5	1.4	6.0	7.4	1.4	1.3	2.7
DDT 5 per cent	1.8	1.1	2.9	0.6	0.6	1.2	1.8	0.6	2.4	0.3	0.0	0.3
Per cent reduction under check						73%			68%			89%

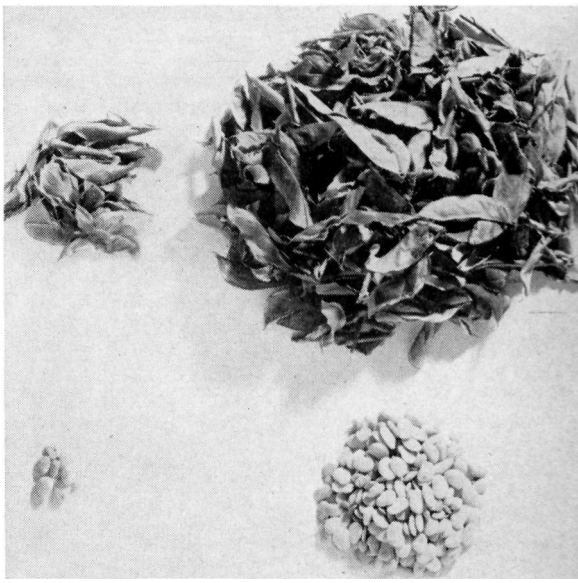
Results of Treating a Field of Baby Lima Beans for Lygus and Worm Control. Patterson 1951.

Condition of sample	Check		DDT, 5 per cent	
	Number	Per cent	Number	Per cent
Damaged pods:				
buckskin	100	8.1	11	0.6
severe worm*	45	3.7	21	1.1
superficial worm†	49	4.0	27	1.4
Total damaged	194	15.8	59	3.2
Undamaged pods	1033	84.0	1810	97.0
Total pods	1227		1869	
Damaged beans:				
necrotic beans	298	9.5	8	0.2
worm damaged*	77	2.5	13	0.32
Total damaged	375	12.0	21	0.5
Undamaged beans	2785	88.0	3916	99.5
Total beans	3160		2937	

* Includes damage done by corn earworm, western yellow-striped armyworm, salt marsh caterpillar and bean lycaenid where pod was penetrated and seed was injured.

† Worm damage where the pod alone was scarred.

Comparative number of pods and beans injured by lygus bugs from sample of 50 plants from each plot. *Left*, treated; *right*, check.



PRUNE

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shows the approximate cost of mechanically harvesting 250 tons of green prunes, and arrow Z shows the approximate harvesting cost when prunes are picked at 25¢ per 50-pound lug.

For crops under 140 tons two curves, B and C, should be considered. Curve C shows the cost of contracting mechanized harvesting equipment at $15 per hour. This method of harvesting is becoming more widely used. Curve B showing the cost of using the rake and scoop, includes a charge for additional preparation of the land.

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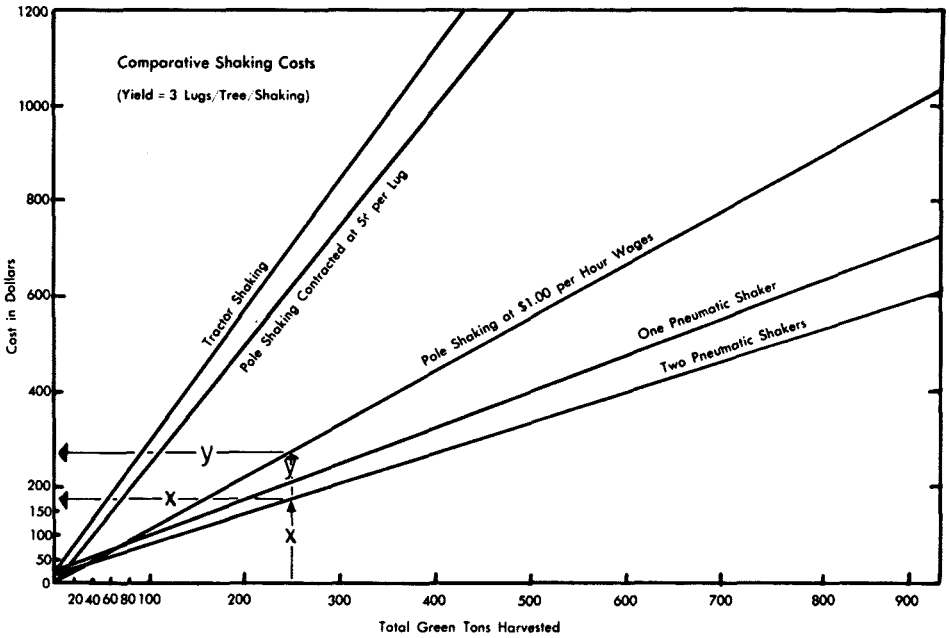

Labor Productivity and Tonnage Capacity Comparison Using Different Shaking Equipment

Shaking Methods	Labor Productivity	Tonnage Capacity Per Unit of Equipment		
	%	Unit of Equipment	Tons	%
Pole Shaking	100	One Pole Shaker	268	100
One Pneumatic Shaker	224	One Pneumatic Shaker	600	224
Two Pneumatic Shakers	224	Two Pneumatic Shakers	1200	448
Tractor Shaker (10 hrs./day)	70	One Tractor Shaker	375	140
Tractor Shaker (20 hrs./day) (with headlights)	70	One Tractor Shaker	750	280

Labor Productivity and Tonnage Capacity Comparison Using Different Integrated Harvesting Methods

Harvesting Method	% Labor Productivity*		Tonnage Capacity	
	(P)	(N)	Equipment/unit/season Tons	%
Hand Picking	100	105	31.2	100
Raking and Scooping— Late Sprinkle Irrigation	365	435	187	600
Raking and Scooping— Pulverized Loam Soil	242	270	83	266
Simple Catcher Frame	197	—	197	630
Improved Catcher Frame.	—	734	506	1620
Mechanical Pickup	—	900	955	3060

* P and N are % labor productivity for pole shaking and pneumatic shaking respectively.

LIMA

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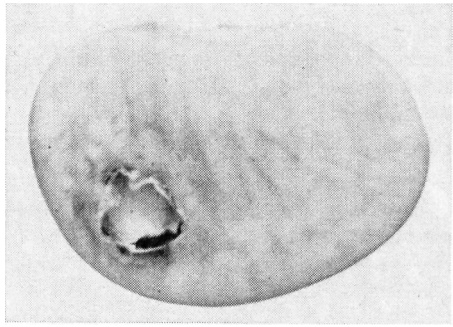
The first treatment—September 7—was made under favorable conditions but the lygus kill was not all that could be desired. The kill resulted in a 73% reduction under the check. This failure to obtain a better kill undoubtedly explains in part why some lygus and worm-injured beans appeared in the treatment.

Lygus counts in the untreated plot rose to a high of 7.4 per sweep on September 19—the heaviest population of lygus bugs encountered in baby limas. At the same time the count in the treated portion of the field had risen to an average of 2.4 lygus per sweep—a 68% reduction under the untreated check. The field was retreated the following morning with a better kill resulting than that obtained by the first application.

On September 26, the treated fields showed an 89% reduction under the check and there was a marked difference in the appearance between the treated and untreated portion of the field. In the check there was no bloom, few if any young pods, and the older pods showed much evidence of insect damage. In the treated portion of the field there was a scattering of bloom, small pods were present in good numbers and no evidence of lygus damage could be found. There was also a noticeable difference in worm damaged pods between the treated and untreated plots.



Necrotic lesion on green baby lima bean caused by the feeding of lygus bugs. Patterson 1951.

At harvest time the total damage of the pods—buckskin, severe and superficial worm damage—was 3.2% in the treated areas, compared with 15.8% in the check plot. The total damage of the beans—necrotic and worm-damaged beans—was 0.5% in the treated field, and 12% in the check plot.

These data do not show the loss due to blossom and pod drop as a result of lygus feeding. An indication of this is given, however, since the green pods from 50 plants from the treated plot weighed 3½ pounds more than did the pods from the untreated plot. In addition, there were 642 more pods from the treated than from the untreated sample of 50 plants.

These data further show that 12% of the beans from the check plot showed some type of insect injury while less than one per cent were similarly injured in the treated plot.

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